# Complete Summary

## TITLE

Postoperative respiratory failure: rate per 1,000 eligible admissions.

## SOURCE(S)

AHRQ quality indicators. Pediatric quality indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Feb 29. various p.

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

# Measure Domain

## PRIMARY MEASURE DOMAIN

Outcome

The validity of measures depends on how they are built. By examining the key building blocks of a measure, you can assess its validity for your purpose. For more information, visit the Measure Validity page.

## SECONDARY MEASURE DOMAIN

Does not apply to this measure

# Brief Abstract

## DESCRIPTION

This measure is used to assess the number of patients with respiratory failure per 1,000 eligible admissions.

## RATIONALE

This indicator is intended to flag cases of postoperative respiratory failure. This indicator limits the code for respiratory failure to secondary diagnosis and procedure codes in order to eliminate respiratory failure that was clearly present on admission. High quality care may reduce the risk of this complication.

## PRIMARY CLINICAL COMPONENT

Postoperative respiratory failure; elective surgery

## DENOMINATOR DESCRIPTION

All elective* surgical discharges under age 18 defined by specific Diagnosis Related Groups (DRGs) and an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code for an operating room procedure

*Elective - Admission type # is recorded as elective (SID ATYPE = 3).

Exclude cases:

- with ICD-9-CM codes for acute respiratory failure in the principal diagnosis field
- where a procedure for tracheostomy is the only operating room procedure
- where a procedure for tracheostomy occurs before the first operating room procedure. *Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available*.
- with ICD-9-CM diagnosis code of neuromuscular disorder
- with respiratory or circulatory diseases (Major Diagnostic Category [MDC] 4 and 5)
- MDC 14 (pregnancy, childbirth, and puerperium)
- neonates with birth weight less than 500 grams

**Note**: Refer to the original measure documentation for specific DRGs and ICD-9-CM codes.

## NUMERATOR DESCRIPTION

Discharges among cases meeting the inclusion and exclusion rules for the denominator with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes 518.81 or 518.84 for acute respiratory failure in any secondary diagnosis field

OR

Discharges among cases meeting the inclusion and exclusion rules for the denominator with ICD-9-CM codes for reintubation procedure in any secondary procedure field as follows:

- (96.04) one or more days after the major operating room procedure code
- (96.70 or 96.71) two or more days after the major operating room procedure code
- (96.72) zero or more days after the major operating room procedure code

# Evidence Supporting the Measure

## EVIDENCE SUPPORTING THE CRITERION OF QUALITY

- A formal consensus procedure involving experts in relevant clinical, methodological, and organizational sciences
- One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

## Evidence Supporting Need for the Measure

### NEED FOR THE MEASURE

Variation in quality for the performance measured

### EVIDENCE SUPPORTING NEED FOR THE MEASURE

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

Miller MR, Zhan C. Pediatric patient safety in hospitals: a national picture in 2000. Pediatrics2004 Jun;113(6):1741-6. [32 references] PubMed

## State of Use of the Measure

### STATE OF USE

Current routine use

### CURRENT USE

Internal quality improvement
Quality of care research

## Application of Measure in its Current Use

### CARE SETTING

Hospitals

### PROFESSIONALS RESPONSIBLE FOR HEALTH CARE

Advanced Practice Nurses
Nurses
Physicians
Respiratory Care Practitioners

### LOWEST LEVEL OF HEALTH CARE DELIVERY ADDRESSED

Single Health Care Delivery Organizations

## TARGET POPULATION AGE

Age less than 18 years

## TARGET POPULATION GENDER

Either male or female

## STRATIFICATION BY VULNERABLE POPULATIONS

Unspecified

# Characteristics of the Primary Clinical Component

## INCIDENCE/PREVALENCE

The incidence of post-operative respiratory failure, using the original Agency for Healthcare Research and Quality (AHRQ) Patient Safety Indicators (PSI) definition, was investigated in pediatric populations (e.g., 2.27 per 1,000 discharges at 0 to 17 years, 1.41 at 18 to 44 years, 2.32 at 45 to 64 years, and 3.85 at 65 or more years). Other groups have analyzed rates of this indicator using the publicly available indicator definition applied to a pediatric population; this definition differs slightly from the definition proposed for this measure. Using Healthcare Cost and Utilization Project (HCUP) data from 2000, Miller and Zhan found 33 pediatric patients (0 to 18 years of age) per 10,000 discharges with the complication of postoperative respiratory failure. Additionally, they found that this complication resulted in an increased mean length of stay (by 24.4 days) and $140,507 in increased charges in affected patients, with 76.6 times increased odds of in-hospital mortality (after adjusting for age, gender, expected payer, up to 30 comorbidities, and multiple hospital characteristics, including ownership, teaching status, nursing expertise, urban location, bed size, pediatric volume, coding intensity, intensive care unit (ICU) bed percentage, and surgical discharge percentage).

## EVIDENCE FOR INCIDENCE/PREVALENCE

Miller MR, Zhan C. Pediatric patient safety in hospitals: a national picture in 2000. Pediatrics2004 Jun;113(6):1741-6. [32 references] PubMed

## ASSOCIATION WITH VULNERABLE POPULATIONS

Post-operative failure is a potential complication after pediatric surgery, as after adult surgery.

See the "Incidence/Prevalence" field.

## EVIDENCE FOR ASSOCIATION WITH VULNERABLE POPULATIONS

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data:

the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

### BURDEN OF ILLNESS

See the "Incidence/Prevalence" field.

### UTILIZATION

See the "Incidence/Prevalence" field.

### COSTS

See the "Incidence/Prevalence" field.

## Institute of Medicine National Healthcare Quality Report Categories

### IOM CARE NEED

Getting Better

### IOM DOMAIN

Effectiveness
Safety

## Data Collection for the Measure

### CASE FINDING

Users of care only

### DESCRIPTION OF CASE FINDING

All elective surgical discharges under age 18 defined by specific Diagnosis Related Groups (DRGs) and an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code for an operating room procedure (see the "Denominator Inclusions/Exclusions" field)

### DENOMINATOR SAMPLING FRAME

Patients associated with provider

### DENOMINATOR INCLUSIONS/EXCLUSIONS

**Inclusions**
All elective* surgical discharges under age 18 defined by specific Diagnosis Related Groups (DRGs) and an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code for an operating room procedure

*Elective - Admission type # is recorded as elective (SID ATYPE = 3).

**Exclusions**
Exclude cases:

- with ICD-9-CM codes for acute respiratory failure in the principal diagnosis field
- where a procedure for tracheostomy is the only operating room procedure
- where a procedure for tracheostomy occurs before the first operating room procedure. *Note: If day of procedure is not available in the input data file, the rate may be slightly lower than if the information was available*.
- with ICD-9-CM diagnosis code of neuromuscular disorder
- with respiratory or circulatory diseases (Major Diagnostic Category [MDC] 4 and 5)
- MDC 14 (pregnancy, childbirth, and puerperium)
- neonates with birth weight less than 500 grams

**Note**: Refer to the original measure documentation for specific DRGs and ICD-9-CM codes.

## RELATIONSHIP OF DENOMINATOR TO NUMERATOR

All cases in the denominator are equally eligible to appear in the numerator

## DENOMINATOR (INDEX) EVENT

Clinical Condition
Institutionalization
Therapeutic Intervention

## DENOMINATOR TIME WINDOW

Time window is a single point in time

## NUMERATOR INCLUSIONS/EXCLUSIONS

**Inclusions**
Discharges among cases meeting the inclusion and exclusion rules for the denominator with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes 518.81 or 518.84 for acute respiratory failure in any secondary diagnosis field

OR

Discharges among cases meeting the inclusion and exclusion rules for the denominator with ICD-9-CM codes for reintubation procedure in any secondary procedure field as follows:

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- (96.70 or 96.71) two or more days after the major operating room procedure code
- (96.72) zero or more days after the major operating room procedure code

**Exclusions**
Unspecified

**MEASURE RESULTS UNDER CONTROL OF HEALTH CARE PROFESSIONALS, ORGANIZATIONS AND/OR POLICYMAKERS**

The measure results are somewhat or substantially under the control of the health care professionals, organizations and/or policymakers to whom the measure applies.

**NUMERATOR TIME WINDOW**

Institutionalization

**DATA SOURCE**

Administrative data

**LEVEL OF DETERMINATION OF QUALITY**

Not Individual Case

**OUTCOME TYPE**

Adverse Outcome

**PRE-EXISTING INSTRUMENT USED**

Unspecified

## Computation of the Measure

**SCORING**

Rate

**INTERPRETATION OF SCORE**

Better quality is associated with a lower score

**ALLOWANCE FOR PATIENT FACTORS**

Analysis by high-risk subgroup (stratification on vulnerable populations)
Analysis by subgroup (stratification on patient factors, geographic factors, etc.)
Risk adjustment method widely or commercially available

**DESCRIPTION OF ALLOWANCE FOR PATIENT FACTORS**

Risk adjustment of the data is recommended using, at minimum, birthweight, age in days, age and AHRQ Clinical Classification Software*.

Application of multivariate signal extraction (MSX) to smooth risk adjusted rates is also recommended.

*__Note__: Information on the Clinical Classification Software (CCS) for ICD-9-CM is available at http://hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp.

### STANDARD OF COMPARISON

Internal time comparison

## Evaluation of Measure Properties

### EXTENT OF MEASURE TESTING

The development of the Agency for Healthcare Research and Quality (AHRQ) Pediatric Quality Indicators utilizes a four pronged approach: identification of candidate indicators, literature review, empirical analyses, and panel review. Candidate indicators were identified through both published literature and a brief survey of national organizations. Literature review provided descriptions and evaluations of some candidate indicators and the underlying relationship to quality of care. Empirical analyses were conducted to explore alternative definitions; to assess nationwide rates and hospital variation; and to develop appropriate methods to account for variation in risk. Clinical panel review helped to refine indicator definitions and risk groupings, and to establish face validity in light of the limited evidence from the literature for most pediatric indicators. Information from these sources was used to specify indicator definitions and make recommendations to AHRQ regarding the best indicators for inclusion in the pediatric indicator set.

A structured review of each indicator was undertaken to evaluate face validity (from a clinical perspective). This process mirrored that undertaken during the initial development of the Patient Safety Indicators. Specifically, the panel approach established *consensual validity*, which "extends face validity from one expert to a panel of experts who examine and rate the appropriateness of each item...." The methodology for the structured review was adapted from the RAND/UCLA Appropriateness Method and consisted of an initial independent assessment of each indicator by clinician panelists using an initial questionnaire, a conference call among all panelists, followed by a final independent assessment by clinician panelists using the same questionnaire. The panel process served to refine definitions of some indicators, add new measures, and dismiss indicators with major concerns from further consideration.

Empirical analyses were conducted to provide the clinical panels and peer review participants with additional information about the indicators. These analyses were also used by the development team to test the alternative specifications and the relative contribution of indicator components in the numerator and denominator. These analyses were not intended to inform issues of precision, bias and construct

validity, which will be addressed separately. The data source used in the empirical analyses was the 2003 Kids' Inpatient Sample (KID).

Refer to the original measure documentation for additional details.

### EVIDENCE FOR RELIABILITY/VALIDITY TESTING

Fitch K, Bernstein SJ, Aguilar MD, et al. The RAND/UCLA appropriateness method user's manual. Santa Monica (CA): RAND; 2001. 109 p.

Green L, Lewis F. Measurement and evaluation in health education and health promotion. Mountain View (CA): Mayfield Publishing Company; 1998.

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

## Identifying Information

### ORIGINAL TITLE

Postoperative respiratory failure (PDI 9).

### MEASURE COLLECTION

Agency for Healthcare Research and Quality (AHRQ) Quality Indicators

### MEASURE SET NAME

Agency for Healthcare Research and Quality (AHRQ) Pediatric Quality Indicators

### DEVELOPER

Agency for Healthcare Research and Quality

### ADAPTATION

This measure was adapted from the AHRQ Patient Safety Quality Indicators.

### PARENT MEASURE

Postoperative Respiratory Failure (PSI 11) (Agency for Healthcare Research and Quality [AHRQ])

### RELEASE DATE

2006 Feb

## REVISION DATE

2008 Feb

## MEASURE STATUS

This is the current release of the measure.

## SOURCE(S)

AHRQ quality indicators. Pediatric quality indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Feb 29. various p.

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

## MEASURE AVAILABILITY

The individual measure, "Postoperative Respiratory Failure (PDI 9)," is published in "Measures of Pediatric Health Care Quality Based on Hospital Administrative Data: The Pediatric Quality Indicators" and "AHRQ Quality Indicators. Pediatric Quality Indicators: Technical Specifications [version 3.2]." These documents are available in Portable Document Format (PDF) from the Pediatric Quality Indicators Download page at the Agency for Healthcare Research and Quality (AHRQ) Quality Indicators Web site.

For more information, please contact the QI Support Team at support@qualityindicators.ahrq.gov.

## COMPANION DOCUMENTS

The following are available:

- AHRQ quality indicators. Pediatric quality indicators: software documentation [version 3.2] - SAS. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar 10. 40 p. This document is available in Portable Document Format (PDF) from the AHRQ Quality Indicators Web site.
- AHRQ quality indicators. Software documentation: Windows [version 3.1a]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Apr 6. 99 p. This document is available in PDF from the AHRQ Quality Indicators Web site.
- Pediatric quality indicators (PedQI): covariates [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 52 p. This document is available in PDF from the AHRQ Quality Indicators Web site.
- Pediatric quality indicators (PedQI): covariates (with POA) [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 52 p. This document is available in PDF from the AHRQ Quality Indicators Web site.

- HCUPnet. [internet]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2004 [accessed 2007 May 21]. [Various pagings]. HCUPnet is available from the AHRQ Web site. See the related QualityTools summary.

### NQMC STATUS

This NQMC summary was completed by ECRI Institute on December 28, 2007. The information was verified by the measure developer on March 31, 2008.

### COPYRIGHT STATEMENT



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